

# PSEUDOCHITINOPOMA PAVIMENTATA NEW SPECIES (POLYCHAETA: SERPULIDAE) FROM OFF TATEYAMA, NEAR TOKYO BAY, CENTRAL JAPAN

Eijiroh Nishi

## ABSTRACT

*Pseudochitinopoma pavimentata* n. sp. (Polychaeta: Serpulidae) is described from specimens dredged off Tateyama (Boso Peninsula), near Tokyo Bay, Central Japan. The genus is characterized by specialized collar chaetae, absence of sickle chaetae, a bulbous operculum; *P. pavimentata* has a pavement-like ornamentation on the operculum. This is the first record of this genus from Japan although another species of *Pseudochitinopoma* are known from the northeast Pacific.

Serpulid polychaetes are common in various habitats, world wide. Some fouling species and common intertidal species have been studied in detail. Nevertheless, serpulid taxonomy is still widely confused, especially that of small species. These small species have been studied by some authors (Bush, 1904; Zibrowius, 1969). Up to now, only one species of *Pseudochitinopoma* was known. It is distributed in the northeast Pacific and very common in temperate California waters (Zibrowius, 1969). A second species was discovered off Boso Peninsula by an expedition by University of Tokyo in May 1995. This second species of *Pseudochitinopoma* is described here.

## MATERIALS AND METHODS

The dredged samples were fixed with 10% neutralized formalin, the tubes were then cracked open and the extracted worms transferred to 70% ethanol. One specimen was dehydrated with an alcohol series (80, 90, 95, 99 and 100% for 10 to 20 min), air-dried, and coated with Pt and gold in a Hitachi E-1030 Ion Sputter, and then viewed in a Hitachi S-800 scanning electron microscope.

## DESCRIPTION

### genus *Pseudochitinopoma* Zibrowius, 1969 *Pseudochitinopoma pavimentata* new species

*Type Species.*—*Hyalopomatopsis occidentalis* Bush, 1904

*Material Examined.*—Off Tateyama, Okinoyama, off the Tokoyo Bay, 34°59'N, 139°39'E, 105–113 m deep, dredged by TANSEI-MARU, University of Tokyo, coll. by Dr. T. Komai. Type series are deposited in Natural History Museum and Institute, Chiba (catalogue number CBM-ZW), holotype, CBM-ZW-50 one complete specimen with tube, paratype, CBM-ZW-51, on SEM stub, one incomplete specimen without tube; paratype, CBM-ZW-52, one complete specimen with tube.

*Other Material.*—Two specimens with tubes, Zoological Museum, University of Amsterdam (ZMA V. Pol. 4018).

*Diagnosis.*—Thoracic setigerous segments 7. Opercular stalk without pinnules or wings. Thoracic membranes short, not united at the ventral face of the last thoracic segment.

Special chaetae of the first thoracic segment with a distal limbate zone and a proximal wing not well separated. No thoracic sickle-chaetae. Abdominal chaetae with a narrow spatulate end and a long lateral tip. Thoracic uncini saw-shaped with about 12 teeth, the anterior tooth bifurcate. Abdominal uncini in all segments rasp-shaped (Zibrowius, 1969).

**Description.**—Tube white, solid, attached to the substratum (shell) over its whole length, subtriangular in cross-section (Fig. 1F), with a more or less conspicuous non-denticulate keel (Fig. 1G). Surface of the tube brilliantly shiny with a glassy granular layer. Tube surface almost smooth, sometimes laterally concave; median keel forming a sharp tooth above the aperture (Fig. 1G). Tube length 5–12 mm, width 0.2–0.8 mm. Body length of longest specimen examined (holotype) 12 mm, complete paratype 6 mm. Body semi-transparent or whitish in preserved condition, color of living specimen unknown. Operculum separated from peduncle by a faint constriction. Opercular diameter up to 0.5 mm in holotype. Bulbous basal part of operculum with an apparent central cavity visible through the wall; cone-shaped distal cap with layer of sub-dermal, whitish granules or flakes (Fig. 1A,B), not unlike a mosaic pavement. Top of opercular cone of a paratype -ZW-52 with cup-like plate (Fig. 1C). Subdermal position of the granules evidenced by the fact that they are not observed by the scanning electron microscope observation.

Collar divided into a large median lobe and a pair of laterodorsal ones which are continuous with short thoracic membranes, ending at the posterior border of segment 3 or uncinigerous segment 2 (Fig. 1D). Branchial lobes short, supporting up to 10 radioles on each side. Radioles long, with 4 to 10 pairs of pinnules, and with filamentous tip (Fig. 1C). Stylodes absent. No gill membrane.

Operculum always on the left side; first filament transformed into a non-pinnulate opercular peduncle completely covered by a thick transparent cuticle. Distal part of the operculum often tapering, having a more or less conical shape, with a still thicker, brown colored cuticle.

First thoracic setigerous segment with fine, almost capillary chaetae (Fig. 2D) and special chaetae; the latter possessing a proximal denticulate expansion, which is clearly distinguishable, but not separated from the distal limbate zone (Figs. 2A,3A). The first setiger lacks uncini. Setigerous segments 2 to 7 with only two types of chaetae, capillary and simple limbate (Fig. 2E,F). No thoracic sickle-chaetae. Abdominal chaetae of two types; simple capillary in posterior part (Fig. 2M), geniculate and denticulate in middle part (Figs. 2K,L,3C) of the abdomen. Geniculate chaetae with about 10 pairs of teeth in 2 rows (Fig. 3C).

Thoracic uncini saw-like with 10–11 teeth in addition to the anterior bifurcate gouge (Figs. 2G,H,3B). Number of uncini in the thoracic rows increasing slightly from segment 2 to segment 7. Abdominal uncini in all segments rasp-shaped, with 3 to 4 rows of teeth and 9 to 10 teeth visible in lateral view (Fig. 2I,J). Pygidium bilobed (Fig. 1H).

**Distribution and Ecological Information.**—105 to 113 m depth, off Tateyama (Boso-Peninsula), near Tokyo Bay, Central Japan (type material), and Formosa Straight, South China Sea, 23°15'N, 117°40'E, leg. H. Christiansen, 26, VII, 1912 (Zool. Mus. Copenhagen; ten Hove, 1989).

**Etymology.**—The species is named *pavimentata* for the pavement-like aspect of the operculum. Gender, feminine.

**Remarks.**—This species is easily distinguished from *Pseudochitinopoma occidentalis* which lacks pavement-like ornamentation on the operculum. The anterior bifurcated part of the thoracic uncini appears to be wider than that of *P. occidentalis* (Zibrowius, 1969).

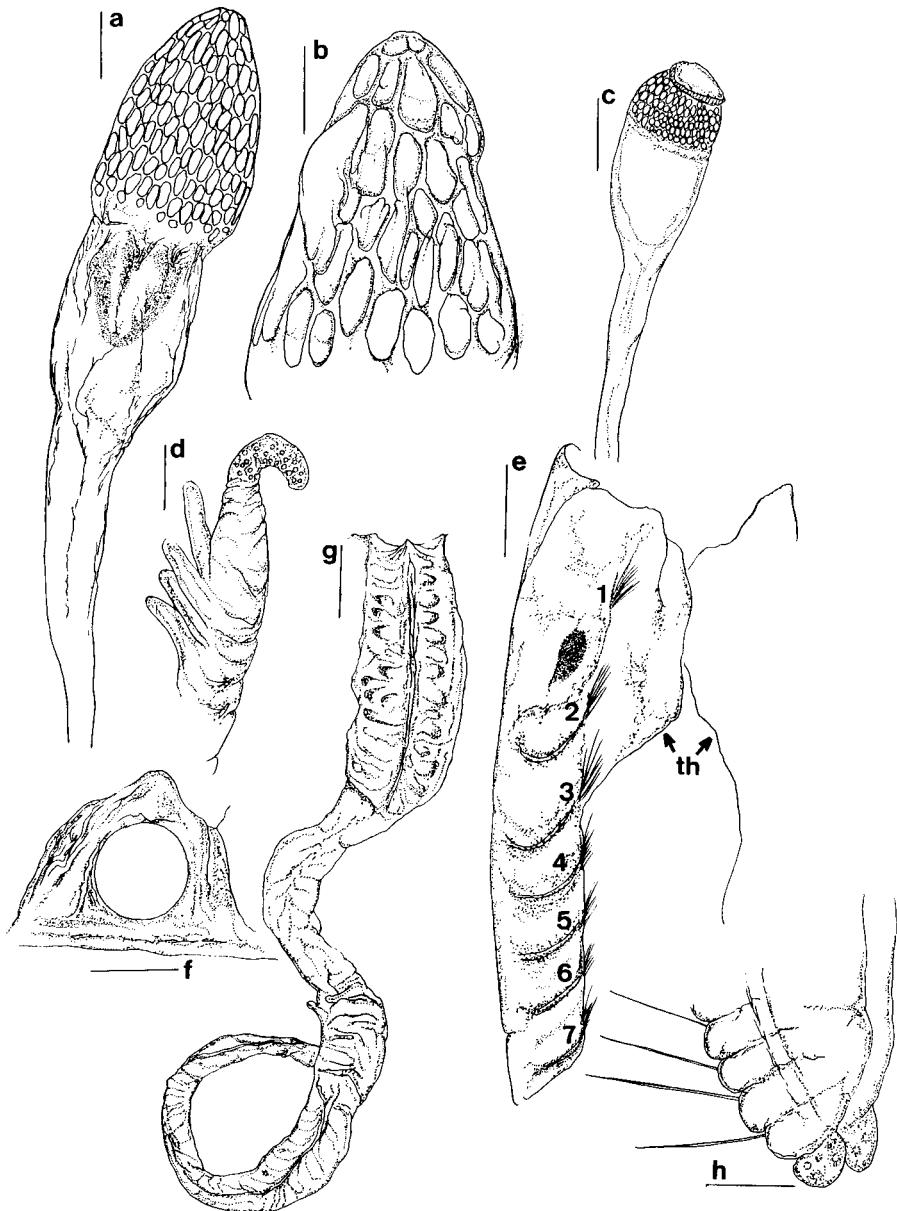


Figure 1. *Pseudochitinopoma pavementata* (all drawn from the holotype (-ZW-50) except c, -ZW-52 (paratype)). a-c, operculum, b, anterior part of operculum; d, most distal part of the branchial filament; e, thoracic region, dorsal view; f, orifice of the tube; g, tube, h, posterior part of the abdomen; th, thoracic membrane, number in e, 1 st to 7th thoracic segment. Scale bars: a and d, 0.2 mm; b, e and h, 0.1 mm; c and f, 0.5 mm; g, 1 mm.

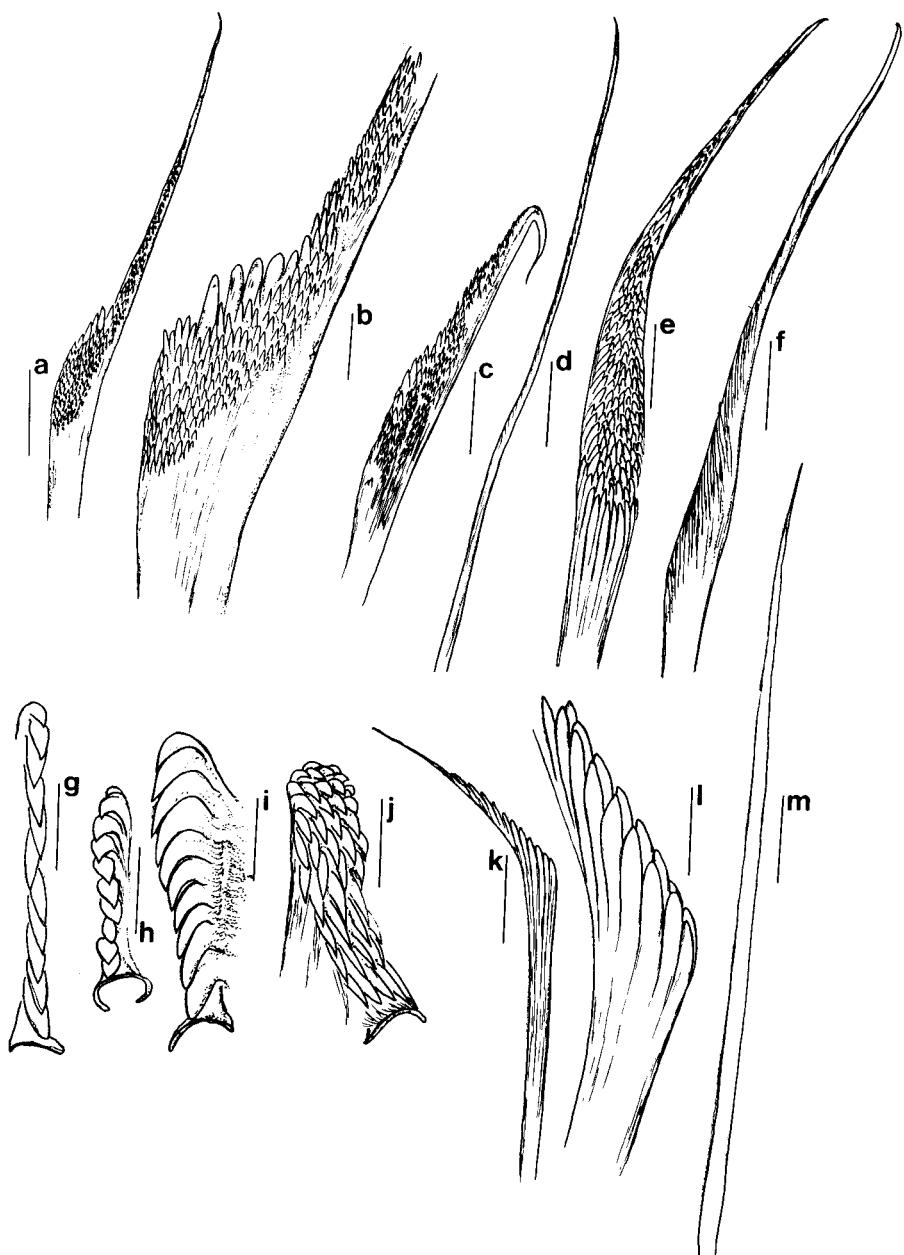


Figure 2. Chaetae of *Pseudochitinopoma pavementata* (drawn from SEM photos of paratype -ZW-51) a to d, 1st thoracic chaetae; a and b lateral view, c ventral view of specialized collar chaeta; d, capillary chaetae in the first setigerous segment; e ventral and f lateral view of thoracic limbate chaetae; g and h, thoracic uncini; i and j, abdominal uncini; k and l, abdominal geniculate chaetae; m, abdominal simple capillary chaetae. Scale bars: a, f, k, and m, 7.5  $\mu$ m; b 6  $\mu$ m; c and l, 2.5  $\mu$ m; d, 10  $\mu$ m; e and g, 5  $\mu$ m; h and i, 3.8  $\mu$ m; j, 3  $\mu$ m.

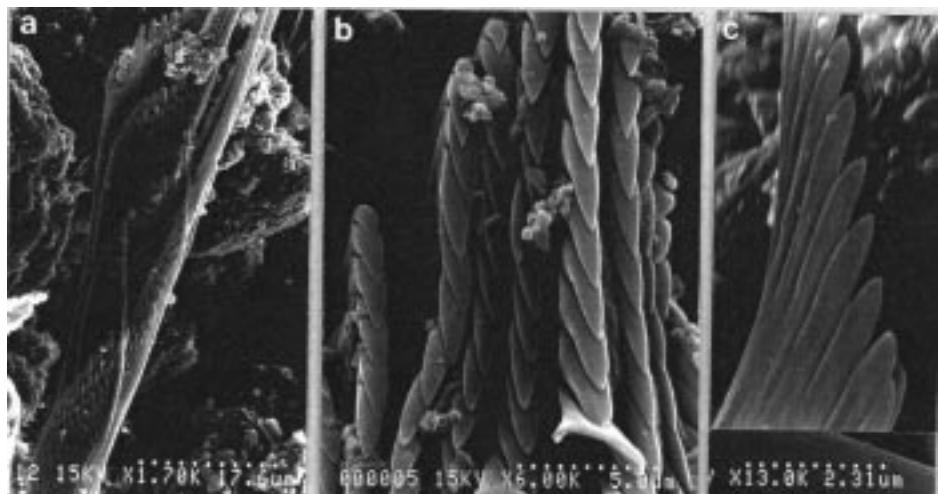


Figure 3. Scanning electron micrographs of *Pseudochitinopoma pavementata*. a, wing of collar chaetae; b, thoracic uncini; c, geniculate abdominal chaetae.

fig. 2g). Observations made with the SEM have revealed that the geniculate abdominal chaetae have teeth in two rows (Figs. 2L, 3C) and elucidated the distribution of teeth in the wing of the specialized collar chaetae.

The color and granular nature of subdermal white granules/flakes of *P. pavementata* are reminiscent of the early stages of calcification observed in the regenerating operculum of *Pomatoceros lamarckii*. In this larger serpulid polychaete, calcification is initiated as a number of small, discrete bead-like spherules which increase in diameter, eventually coalescing to form the strongly calcified opercular plate (Bubel et al., 1985). I could not establish in this study that the granules/flakes are an indication of (partial) calcification in the operculum of *P. pavementata*.

A total of five worms were studied and all were attached to bivalve shells. Two worms were in close proximity to each other on shells, others well separated on a valve, with many serpulid and spirorbid polychaetes (only empty tubes) and small vermetid tubes, and bryozoans.

#### DISCUSSION

This is the first record of the genus *Pseudochitinopoma* in Japan. Despite intensive serpulid studies in Japan, resulting in many new records and in the description of many new species (Imajima, 1976, 1977; Imajima and ten Hove, 1989), no representative of the genus *Pseudochitinopoma* had been recorded previously from Japan. *Pseudochitinopoma occidentalis* is known all along the Pacific coast of North America, Alaska to California, with a wide bathymetric range (from shore to about 200 m depth; Zibrowius, 1969). Additional surveys near Boso Peninsula and Tokyo Bay are needed to determine the exact range of distribution of *P. pavementata*.

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ADDRESS: *Natural History Museum and Institute, Chiba Aoba 955-2, Chuo-ku, Chiba 260 Japan. E-mail: cr2e-nis@asahi-net.or.jp.*